Reduction of extraneous 40Ar contamination for accurate K-Ar age determinations: an experimental study in various sample sizes

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A fundamental assumption of K-Ar dating is that the samples initially contained no radiogenic 40Ar, but sometimes rocks contain radiogenic 40Ar called extraneous 40Ar. Some previous study reported argon isotopes of historical lavas had anomalously high 40Ar/36Ar ratios, and show old apparent ages. Since extraneous 40Ar is likely contained in the phenocrysts and xenoliths, groundmass samples are generally prepared for analysis. Besides, Ozawa et al. (2005) showed fine-grained groundmass samples had less extraneous 40Ar contamination, and suggested that extraneous 40Ar is contained in fluid inclusions or vesicles and released during crushing. We measure argon isotopic ratios in various sizes of young lava samples, and investigated the reduction of extraneous 40Ar contamination. The finer samples roughly showed lower 40Ar/36Ar ratios but more difficult to handling of the preparation such as mineral separation and wrapping in foils for isotopic measurements.

Keywords: K-Ar dating, extraneous 40Ar, sample size